

# NOTES ON *PALIOLLA COOKI* (ANGAS, 1864) FROM SOUTHERN AUSTRALIA

(Opisthobranchia: Gymnodorididae)

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## SUMMARY

*Paliolla cooki* (Angas, 1864) is a specialized gymnodoridid opisthobranch with 9-10 needle-like radular teeth, each arising from its own socket in the pharynx and up to 1.4 mm in length. It apparently uses the teeth to pierce the skin of its food, and sucks in the body fluids by means of buccal pump modifications of the pharyngeal wall. It is found from central New South Wales, through Victoria to St Vincent Gulf, South Australia, from low tide to 55 m.

## INTRODUCTION

*Paliolla cooki* (Angas, 1864) is a little known gymnodoridid phanerobranchiate opisthobranch of SE Australia. Its unusual radular structure was first described when the writer (1958) proposed the genus *Paliolla* with *Polycera cooki* Angas, 1864, as type. The purpose of these notes is to redescribe the radula, to present details of the pharynx and reproductive organs, and to give distributional data.

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## SYSTEMATIC SECTION

Family Gymnodorididae

*Paliolla cooki* (Angas, 1864)

Text fig. 1-4

*Polycera cooki* Angas, 1864: 57, pl. 5, fig. 6.

*Paliolla cooki*. Bergh, 1892: 1142; Basedow & Hedley, 1905: 145; Iredale & McMichael, 1962: 95.

*Paliolla cooki*. Burn, 1958: 24, pl. 1, fig. 4, text fig. 3; 1965: 89; Macpherson & Gabriel, 1962: 253.

**Pharynx.** (Text fig. 1) Anteriorly conical, posteriorly three-lobed, exceeding one-quarter preserved body length. Transversely muscled conical portion enclosing wider base of hyaline cuticularized oral tube. Three-lobed portion larger, with thick pliable muscular walls; base of radular teeth visible ventrally in centre lobe (? vesigial radular sac); large salivary glands with granular surface seated on lateral lobes (? buccal pump modifications). Small retractor muscles insert near anterior edge of conical portion, and pair of large protractor muscles insert behind salivary glands. Cuticular oral tube smooth and entire, but not extending posteriorly to lobed portion of pharynx. Radular teeth (Text fig. 2-3) 9 or 10 in number, up to 1.4 mm in length, needle-like in shape with slender compressed base. Each tooth rising from a separate socket and not con-

nected by or joined to a chitinous odontophoral ribbon. Teeth smooth, neither hollow nor with visible signs of constant regeneration. Teeth in three groups; central group of four to six teeth, longest of which usually greater in length than teeth in lateral groups and with tips level with or projecting from oral tube, lie grouped together like bundle of sticks with their bases in fundus of centre lobe; two lateral groups of two or three teeth standing in sockets in soft muscular pad on posterior wall of each lateral lobe.

*Reproductive organs.* (Text fig. 4) Ampulla (a) small, reniform, with slender hermaphrodite duct and duct to male and female branches. Prostate (p) slender and soft, vas deferens short, penial sheath (d) fusiform, armed internally with closely set, minute, hyaline hooks. Vagina short, opening into thin-walled ovoid spermatheca (t) that lies ventrally to common genital aperture. Uterine duct very slender and long, but wider (? fertilizing chamber) at duct to elongate thickwalled spermatocyst (s) which crosses under prostate. Cream coloured albumen gland (b) with distinctive branch to brownish mucous gland (m) which in specimen figured was greatly distended. Hermaphrodite glands bright pinkish-red in life and visible through semi-translucent skin, just anterior to level of gills. They lie as discrete masses on anterior surface of digestive gland.

*Distribution.* SE Australia, from Long Reef, central New South Wales, through Victoria, to Port Noarlunga, St Vincent Gulf, South Australia, from low tide to 55 m.

*Material examined.* NEW SOUTH WALES. Long Reef, 19 September 1959, 1 spec. (F29548). Fairlight, Sydney Harbour, 10 October 1959, 1 spec. coll E. de Villa (F29547).

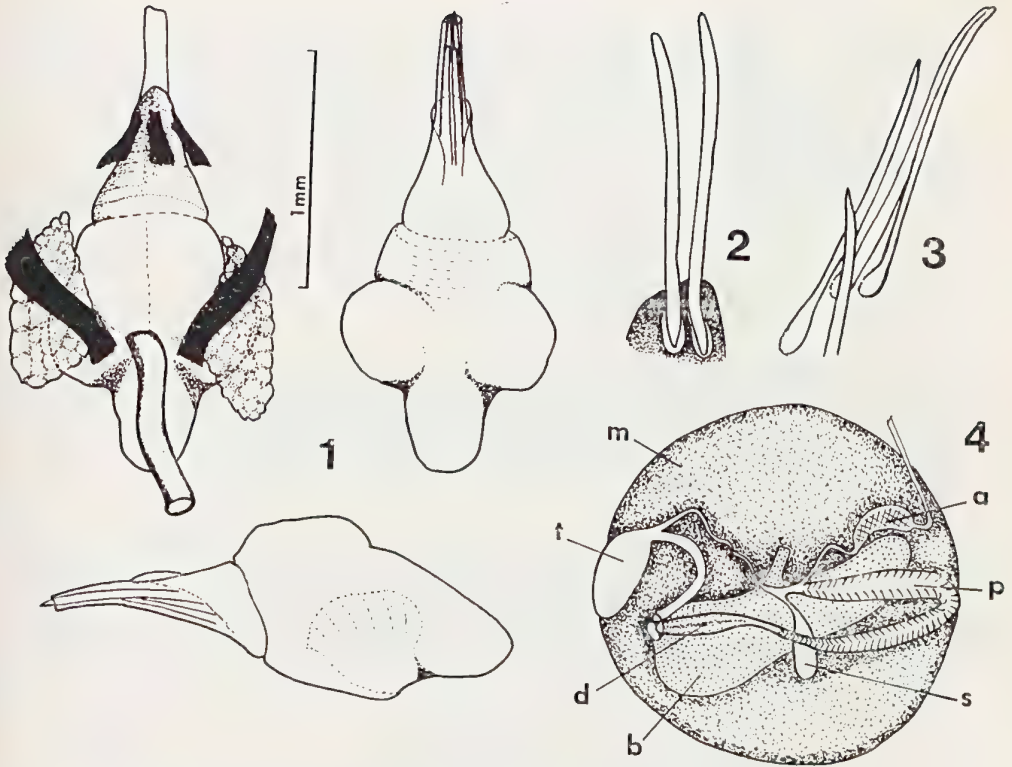
VICTORIA. Between East Moncoeur Island and Hogan Group, eastern Bass Strait, 25 November 1973, 1 spec. from 55 m, polyzoa shell and sand bottom (F29546). Point Lonsdale, 3 December 1966, 2 spec. (F29535); 2 December 1970, 2 spec. (F29536). Bancoora Reef, Breamlea, 1 November 1957, 1 spec. (F20980). Point Danger, Torquay, 17 December 1955, 1 spec. (F20981); 9 March 1957, 2 spec. (F20982); 20 October 1958, 3 spec. (F20983); December 1957 — November 1974, 14 specimens (F29537 — F29544). Aireys Inlet, 7 April 1957, 1 spec. (F19475).

SOUTH AUSTRALIA. Port Noarlunga, St Vincent Gulf, 22 November 1970, 1 spec. from 5 - 6.5 m under rock in weed, coll. N. Coleman (F29545). New record for South Australia.

The specimen from 55 m in eastern Bass Strait was found on the tunic of a large solitary pyruid ascidian. The other specimens, all collected (except where indicated) by the writer between 1955 and 1974, were found under rocks at or below low tide level. Though no direct observation has been made of any association, pale buff or creamy pink polyzoans were usually present on the underside of the rocks from which *Paliolla cooki* was collected.

#### DISCUSSION

The original description and figure of the radula of *Paliolla cooki* (Burn, 1958: 24, fig. 3) were based upon material boiled in caustic soda (NaOH), where the cuticular oral tube contracted and bound the teeth into a neat bundle of glassy rods. Even so, three series of teeth were noted, though anterior and posterior ends were confused.

*Paliolla*

TEXT FIG. 1-4. *Paliolla cooki* (Angas, 1864).

1. Dorsal, ventral and lateral views of pharynx from Point Lonsdale specimen (F29536), preserved length 5.5 mm.

2. Two teeth in situ in specimen from 55 m, between East Moncoeur Island and Hogan Group, eastern Bass Strait (F29546), preserved length 8 mm.

3. Four teeth from Point Danger, Torquay specimen (F29543), preserved length 5.1 mm.

4. Reproductive organs from Point Danger, Torquay specimen (F29543), preserved length 5.1 mm, mucous gland distended; a—ampulla, b—albumen gland, d—vas deferens, m—mucous gland, p—prostate, s—spermatocyst, t—spermatheca.

1-3. Drawn to same scale.

Block courtesy of F. V. Murray Memorial Fund.

The present description of the pharynx is based upon dissection of three specimens from Victorian localities, and the two specimens from New South Wales. The largest preserved specimen, from 55 m in eastern Bass Strait, has a body length of 8 mm and a pharynx 2.4 mm long. Three other preserved specimens had body/pharynx lengths of: Fairlight 5.4/2 mm, Point Lonsdale (F29535) 5/1.5 mm, Long Reef 4.4/1.17 mm. All had the same shape of the pharynx and numbers of teeth.

The radular teeth, for which no notion can be formulated, are very close in shape to the marginal teeth of some *Gymnodoris* spp., e.g. *striata* (Eliot, 1908) (O'Donoghue, 1929: fig. 222; Baba, 1937: fig. 1), *okinawae* Baba, 1936, and *plebia* (Bergh, 1877) (Kay and Young, 1969: fig. 75-76). Nowhere in the opisthobranch literature can the writer find any reference to radular teeth of such singular length as 1.4 mm per tooth, or of each tooth rising from individual sockets in different parts of the pharynx, or of teeth not connected by some sort of chitinous ribbon.

The cuticular oral tube of *P. cooki* is similar to that of the related genus *Lecithophorus* Macnae, 1958, the type species of which, *capensis* Macnae (1958: 362), is devoid of radular teeth. *L. capensis* was found associated with compound ascidians. Probably *Paliolla*, like *Lecithophorus*, is a very specialized gymnodoridid capable of piercing the hard skin of its food, and sucking out the body juices with a suctional pumping acting of the pharynx. Identical food procuring and ingestion is found in the distantly related sacoglossan opisthobranchs, a group confined to eating algal juices and eggs of other opisthobranchs. The suctorial phanerobranchiate dorids are closely related and have a strongly muscular pharynx that includes a buccal pump. The latter species have, however, at least two radular teeth per row in a number of rows, and none can be confused with *Paliolla*.

The discrete hermaphrodite glands indicate that *Paliolla* is close to *Gymnodoris*. In the latter, this is a diagnostic character. In many species of *Gymnodoris*, the voluminous prostate covers portion of the spermatheca, and in most other species, the prostate and spermatheca are in close proximity. In *Paliolla*, the spermatheca is far removed from the male ducts.

The distribution of *P. cooki* from central New South Wales to St Vincent Gulf, South Australia coincides with that of many other SE Australian opisthobranchs (Burn 1969: 99). Though it has not yet been found on the Tasmanian coastline, *P. cooki* should be regarded as belonging to the Maugean cool temperate fauna of southern Australia (Dartnall 1974).

## REFERENCES

- ANGAS, G. F., 1864. Descriptions d'espèces nouvelles appartenant à plusieurs genres des Mollusques Nudibranches des environs de Port Jackson, etc. *J. Conch. (Paris)*, 12: 43-69, pl. 4-6.
- BABA, K., 1937. Record of a nudibranch, *Gymnodoris striata* (Elliott), from Amakusa, Japan. *Zool. Mag. (Japan)*, 49(6): 216-218.
- BASEDOW, H., and C. HEDLEY, 1905. South Australian nudibranchs, etc. *Trans. R. Soc. S. Aust.*, 29: 134-160, pl. 1-12.
- BERGH, R., 1892. *Malacologische Untersuchungen*. In C. Semper, ed., *Reisen in Archipel der Philippinen*. 3(18): 995-1165.
- BURN, R., 1958. Further Victorian Opisthobranchia. *J. Malac. Soc. Aust.*, 1(2): 20-36.
- , 1965. A centennial commentary and zoogeographical remarks on Angas' Sydney nudibranchs. *J. Conch. (Paris)*, 104: 35-33.
- , 1969. A memorial report on the Tom Crawford collection of Victorian Opisthobranchia. *J. Malac. Soc. Aust.*, 1(12): 64-105.
- DARTNALL, A. J., 1974. Littoral biogeography. In W. D. Williams, ed., *Biogeography and Ecology in Tasmania*: 171-194.
- IREDALE, T., and D. F. McMICHAEL, 1962. A reference list of the marine Mollusca of New South Wales. *Mem. Aust. Mus.*, 11: 1-109.
- KAY, A. E., and D. K. YOUNG, 1969. The Doridacea of the Hawaiian Islands. *Pacific Sci.*, 23(2): 172-231.
- MACNAE, W., 1958. The families Polyceridae and Goniodorididae in South Africa. *Trans. R. Soc. S. Afr.*, 35(4): 341-372, pl. 17-18.
- MACPHERSON, J. H., and C. J. GABRIEL, 1962. *Marine Molluscs of Victoria*. Melbourne University Press, Melbourne. 15 + 475 pp.
- O'DONOGHUE, C. H., 1929. Report on the Opisthobranchiata. Results of the Cambridge Expedition to the Suez Canal, 1924. *Trans. Zool. Soc. London*, 22: 713-841.